

**Technical Support Document for
Air Quality Permit No. 41493
Arizona Public Service Company – Yucca Power Plant**

This permit is a significant permit revision of Air Quality Class I Permit No. 31876 issued on January 26, 2006, to Arizona Public Service Company (APS), the Permittee, for operation of its Yucca Power Plant located at 7522 South Somerton Avenue, Yuma, Arizona 85364. APS proposes to install and operate turbine inlet fogging with overspray water systems on three simple cycle combustion gas turbines (CTs) at the Yucca plant, namely, CT1, CT2 and CT3, and is applying for this permit revision to authorize installation and operation of the fogging and overspray systems.

Inlet air fogging and overspray are two separate processes. Inlet fogging refers to the direct evaporative cooling of inlet air up to the saturation point. Overspray is the injection of more fine water mists into the inlet of the turbine compressor than can be evaporated under ambient conditions. These processes reduce the temperature of the air entering the turbines, which, in turn, increase the mass flow rate and power output and decreases NO_x emissions.

In addition, APS is proposing a separate parallel permit action (Permit No. 41191) to add two new simple-cycle CTs and one new mechanical draft cooling tower, which will increase the emissions of all regulated air pollutants. To avoid triggering the New Source Review (NSR) provisions when the emission increases from the two projects are aggregated, APS is voluntarily accepting in this permit revision, certain hourly and seasonal limitations as follows that pertain to the operation of the fogging/overspray systems:

- APS will only operate the fogging/overspray systems during the months of May through September; and
- APS will not operate the CT1 and CT2 fogging/overspray systems for a combined total of more than 400 hours per year, nor the CT3 fogging/overspray system for more than 200 hours per year.

One of the assumptions that APS used in calculating the post-project emissions is that the fogging project will increase the heat input capacity to 296 MMBtu/hr each for CT1 and CT2 and to 884 MMBtu/hr for CT3. The assumed post-project heat input capacities are being carried forward to this permit revision as follows:

- The fogging/overspray systems will be operated such that, during the operating season, APS will limit the average hourly heat input rate for CT1 and CT2 each to not greater than 296 MMBtu/hr and the average hourly heat input rate for CT3 to not greater than 884 MMBtu/hr.

The NO_x and CO emissions generated from combustion processes tend to counterbalance each other, meaning that the lower temperature tends to lead to lower NO_x emission levels but elevate CO emission levels. To address this issue, APS points to technical studies which indicate that when the CT reaches a load of 50% or higher with the firing temperature at 1500 °F or above, the changes in the firing temperature will have little or no effect on thermal CO production. The optimal load condition is being captured in the permit revision with the following condition:

- APS will not allow to utilize the fogging/overspray systems unless the affected CT reaches at least a 50% load.

The combustion turbines CT1, CT2 and CT3 are currently subject to the Arizona Administrative Code (A.A.C.) R18-2-719, namely, Standards of Performance for Existing Stationary Rotating Machinery. If the addition of the fogging/overspray systems were to result in an increase in the SO₂ emission rate in kg/hr, the affected CT would have to be subject to the more stringent federal standards, namely, Subpart GG - Standards of Performance for Stationary Gas Turbines from Title 40, Part 60 of the Code of Federal Regulations (40 CFR 60). To avoid being affected by the new source performance standards (NSPS), the permit revision also limits the use of fuel to only pipeline natural gas (PNG) when operating the fogging/overspray systems. Permit No. 31876 currently allows APS to burn either PNG as primary fuel or low sulfur diesel as backup fuel in the three turbines. Since natural gas is considered a clean fuel with regard to SO₂ emissions, the limit on fuel usage to PNG during fogging operation will ensure that the fogging project will not cause an increase in SO₂ emissions.

Among other conditions included in the permit revision are the initial performance tests for NO_x and CO emissions required to be conducted after the initial startup of the fogging/overspray systems to verify that the post project NO_x and CO emission increases do not exceed the significance levels as defined in A.A.C. R18-2-101.104, consistent with what was presented in the permit application and, therefore, safeguarding the NSR and NSPS triggering threshold. Monitoring, recordkeeping and reporting are also required to track compliance with the above described limitations.

With all these permit conditions in place, APS estimates that the annual emissions increase of NO_x, CO, PM₁₀, and VOC will be 5.7, 0.3, 0.1, and 0.03 tons per year, respectively. The estimated annual emission increases are caused by the expected increase in power output during the operation of the fogging/overspray system, not by the emission rate in lbs per hour of the respective pollutants.